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Optical Coherence Tomography for Diagnosing Periodontal Disease

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We have, in this preliminary study, investigated the use of optical coherence tomography (OCT) for diagnosis of periodontal disease. OCT is a noninvasive technique for producing high resolution (10-20μm) optical images of both hard and soft tissue structures. These images are similar to those produced using ultrasound technology. However, near-infrared light rather than sound waves are used as the detection medium. We took in vitro OCT images of the dental and periodontal tissues from a young pig and compared them to histological sections. These images distinguish tooth and soft tissue relationships that are important in diagnosing and assessing periodontal diseases. We have characterized the attachment of gingiva to the tooth surface and located the cementoenamel junction (through tissue). This junction is an important reference point for defining attachment level in the diagnosis of periodontal disease. The boundary between enamel and dentin is visible for most of the length of the anatomical crown, allowing quantitation of enamel thickness and character. Similar information concerning gingiva structure is also evident in these images, raising the potential of pinpointing subgingival deposits or calculus and identifying soft tissue pathosis.

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